CLAIMS

1. An ablation treatment apparatus, comprising:

an electromagnetic energy source;

a trocar including a distal end, and a hollow lumen extending along a longitudinal axis of the trocar;

a multiple antenna ablation device including three or more antennas positionable in the lumen and deployable from the trocar lumen in a lateral direction relative to the longitudinal axis at a selected tissue mass, each of a deployed antenna having an electromagnetic energy delivery surface size sufficient to create a volumetric ablation between the deployed antennas without impeding out a deployed antenna when 5 to 200 watts of electromagnetic energy is delivered from the electromagnetic energy source to the multiple antenna ablation device; and

at least one cable coupling the multiple antenna ablation device to the electromagnetic energy source.

2. The apparatus of claim 1, wherein each of the deployed antenna has an electromagnetic energy delivery surface size sufficient to create a volumetric ablation between the deployed antennas without impeding out a deployed antenna when 5 to 100 watts of electromagnetic energy is delivered from the electromagnetic energy source to the multiple antenna ablation device.

3. The apparatus of claim 1, wherein each of the deployed antenna has an electromagnetic energy delivery surface size sufficient to create a volumetric ablation between the deployed antennas without impeding out a deployed antenna when 5 to 75 watts of electromagnetic energy is delivered from the electromagnetic energy source to the multiple antenna ablation device.

4. The apparatus of claim 1, wherein each of the deployed antenna has an electromagnetic energy delivery surface size sufficient to create a volumetric ablation between the deployed antennas without impeding out a deployed antenna when 5 to 50 watts of electromagnetic energy is delivered from the electromagnetic energy source to the multiple antenna ablation device.

5. The apparatus of claim 1, wherein each of the antennas is coupled to the electromagnetic energy source.

6. The apparatus of claim 1, wherein the trocar has an outer diameter no greater than 13 gauge.

7. The apparatus of claim 1, wherein the trocar has an outer diameter no greater than 14 gauge.

8. The apparatus of claim 1, wherein the trocar has an outer diameter no greater than 15 gauge.

9. The apparatus of claim 1, wherein four antennas are deployed from the trocar at the selected tissue mass.

10. The apparatus of claim 1, wherein five antennas are deployed from the trocar at the selected tissue mass.

11. The apparatus of claim 1, wherein six antennas are deployed from the trocar at the selected tissue mass.

12. The apparatus of claim 1, wherein at least two of the antennas are deployed out of the trocar distal end.

13. The apparatus of claim 1, wherein the trocar includes one or more side ports formed in a body of the trocar.

14. The apparatus of claim 9, wherein at least one antenna is deployed into the selected tissue mass from the trocar distal end and at least one antenna is deployed into the selected tissue mass from a side port.

15. The apparatus of claim 1, wherein the antennas are RF electrodes and the electromagnetic energy source is an RF energy source.

16. The apparatus of claim 1, wherein the multiple antenna ablation device operates in a monopolar mode.

17. The apparatus of claim 1, wherein the multiple antenna ablation device operates in a bipolar mode.

18. The apparatus of claim 1, wherein the apparatus is switchable between bipolar and monopolar operation.

19. The apparatus of claim 1 wherein at least a portion of a distal end of each antenna is constructed to be structurally less rigid than the trocar.

20. The apparatus of claim 1, further comprising:
a sensor at least partially positioned on an exterior surface of an antenna.

21. The apparatus of claim 1, further comprising:
an insulation layer positioned in a surrounding relationship around at least a portion of an exterior of the trocar.

22. The apparatus of claim 21, wherein a distal end of the insulation layer is removed from the distal end of the trocar and create an electromagnetic energy delivery surface at the distal end of the trocar.

23. The apparatus of claim 1, wherein the trocar lumen is coupled to an infusion medium source to receive an infusion medium.

24. The apparatus of claim 1, further comprising:
a cooling element coupled to at least one of the antennas.

25. The apparatus of claim 24, wherein the cooling element comprises:
a structure positioned in at least one of the antennas including at least one channel configured to receive a cooling medium.

26. The apparatus of claim 24, wherein the cooling medium is recirculated through the channel.

27. An ablation treatment apparatus, comprising:
an electromagnetic energy source;
a trocar including a distal end, and a hollow lumen extending along a longitudinal axis of the trocar;
a multiple antenna ablation device including a plurality of antennas positionable in the trocar lumen and deployable from the trocar lumen in a lateral direction relative to the longitudinal axis at a selected tissue mass, wherein the plurality of antennas includes a sufficient number of antennas to create an ablation volume between the antennas in the selected tissue site without impeding out the

plurality of antennas when 5 to 200 watts of electromagnetic energy is delivered from the electromagnetic energy source to the plurality of antennas; and

at least one cable coupling the multiple antenna ablation device to the electromagnetic energy source.

28. The apparatus of claim 27, wherein each of the deployed antenna has an electromagnetic energy delivery surface size sufficient to create a volumetric ablation between the deployed antennas without impeding out a deployed antenna when 5 to 100 watts of electromagnetic energy is delivered from the electromagnetic energy source to the multiple antenna ablation device.

29. The apparatus of claim 27, wherein each of the deployed antenna has an electromagnetic energy delivery surface size sufficient to create a volumetric ablation between the deployed antennas without impeding out a deployed antenna when 5 to 75 watts of electromagnetic energy is delivered from the electromagnetic energy source to the multiple antenna ablation device.

30. The apparatus of claim 27, wherein each of the deployed antenna has an electromagnetic energy delivery surface size sufficient to create a volumetric ablation between the deployed antennas without impeding out a deployed antenna when 5 to 50 watts of electromagnetic energy is delivered from the electromagnetic energy source to the multiple antenna ablation device.

31. The apparatus of claim 27, wherein the trocar has an outer diameter no greater than 15 gauge.

32. The apparatus of claim 27, wherein the multiple antenna ablation device is an RF device.

33. The apparatus of claim 32, wherein the multiple antenna ablation device operates in a monopolar mode.

34. The apparatus of claim 32, wherein the multiple antenna ablation device operates in a bipolar mode.

35. The apparatus of claim 32, wherein the multiple antenna ablation device is switchable between bipolar and monopolar operation.

36. A method for creating a volumetric ablation in a selected tissue mass, comprising:

providing a multiple antenna ablation apparatus including a trocar with a trocar lumen, a plurality of antennas deployable from the lumen, and an electromagnetic energy source coupled to the plurality of antennas;

inserting the trocar into the selected tissue mass with the plurality of antennas positioned in the trocar lumen;

advancing the plurality of antennas from the trocar lumen in a lateral direction relative to a longitudinal axis of the trocar into the selected tissue mass;

delivering 5 to 200 watts of electromagnetic energy from the electromagnetic energy source to the plurality of antennas without impeding out an antenna of the plurality of antennas; and

creating the volumetric ablation in the selected tissue mass.

37. The method of claim 36, wherein 5 to 100 watts of electromagnetic energy source to the plurality of antennas without impeding out an antenna of the plurality of antennas.

38. The method of claim 36, wherein 5 to 75 watts of electromagnetic energy source to the plurality of antennas without impeding out an antenna of the plurality of antennas.

39. The method of claim 36, wherein 5 to 50 watts of electromagnetic energy source to the plurality of antennas without impeding out an antenna of the plurality of antennas.

40. The method of claim 36, wherein the ablation volume is a spheroid geometry.

41. The method of claim 36, wherein the ablation volume is a spherical geometry.

42. The method of claim 36, wherein the ablation volume is a partial spherical geometry.

43. The method of claim 36, wherein the ablation volume is formed continuously between adjacently deployed antennas of the plurality.

44. The method of claim 36, wherein the trocar has an outer diameter no greater than 15 gauge.